Abstract ID : 590

Title : Validation Studies of Blubber Quantitative Fatty Acid Signature Analysis (QFASA) with Captive Steller Sea Lions (Eumetopias jubatus)

Category : Ecology

Student : Not Applicable

Preferred Format : Oral Presentation

Abstract : Accurate estimates of diets of marine mammals are vital for understanding their role in the ecosystem, but current methods are often imprecise and limited. QFASA has been developed to estimate the species composition of marine mammal diets from the fatty acid (FA) signatures of their blubber and that of their potential prey. We conducted captive feeding studies (1-9 months each) on seven juvenile female Steller sea lions (SSL) to evaluate QFASA's ability to identify known mixed-prey diets and to provide information on FA turnover time, deposition rates and the FA calibration coefficients (FA-CCs) required for QFASA. For each animal, 2-6 sequential full-depth blubber biopsies (n=33) were collected mid-side, following various periods of controlled diet, including 1-4 week pulses of salmon, capelin, eulachon, walleye pollock or Atka mackerel. Changes in mass and body composition (using D2O dilution) were also measured. We tested differences in prey FA signatures and our ability to differentiate them in diets using hierarchical cluster analysis and diet simulations. Simulation results (1000 runs each) reconstructed prey composition of diet with 0-4% error, depending on model parameters used. SSL FA-CCs (derived from one animal on a diet of pure herring for 20 months) were comparable but not interchangeable to those previously obtained from phocid seals. QFASA correctly identified the major components of mixed diets and relative species proportions. QFASA also tracked dietary changes in individuals that ate increasing amounts of certain prey or had specific prey removed. FA signatures in blubber appeared to reflect a feeding period of about 1.5-2 months. Overall, QFASA results were promising, but did result in some false identifications of prey, depending on modeling parameters used (FA-CCs, number of FAs included). The greatest errors occurred when phocid CCs were used. Additional evaluation and estimation of SSL-specific CCs is required for refining the application of QFASA to SSL.